EXERCISE 1-1

A *Indicate whether each table specifies a function.*

1.

DOMAIN	RANGE
3	0
5	1
7	2

2.

DOMAIN	RANGE
−1	5
−2	7
−3	9

3.

DOMAIN	RANGE
3	5
	6
4	7
5	8

4.

DOMAIN	RANGE
8	0
9	1
	2
10	3

5.

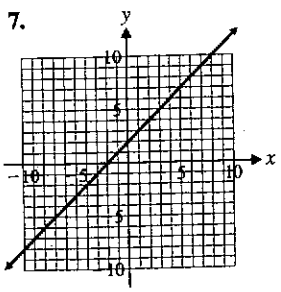
DOMAIN	RANGE
3	5
6	
9	6
12	

6.

DOMAIN	RANGE
−2	
−1	6
0	
1	

Indicate whether each graph in Problems 7–12 specifies a function

7.



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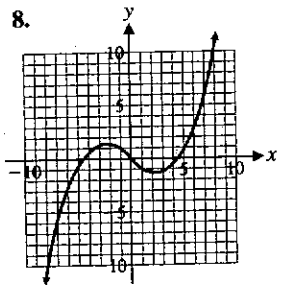

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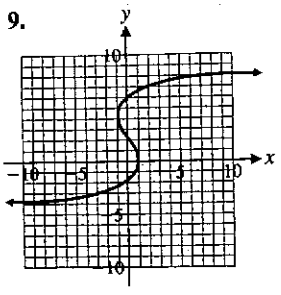
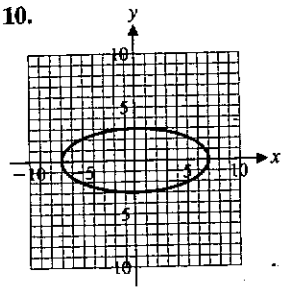


10.



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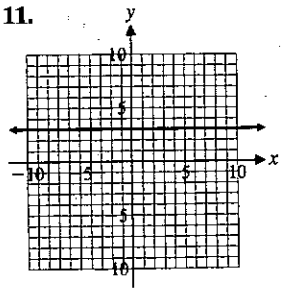
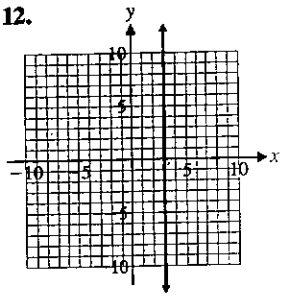


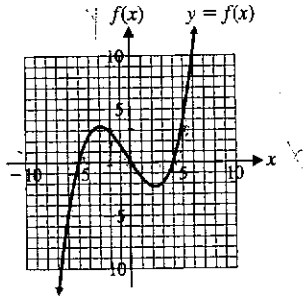
12.



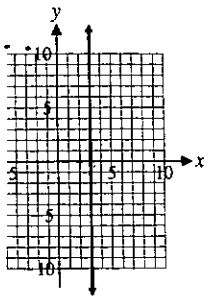
If $f(x) = 3x - 2$ and $g(x) = x - x^2$, find each of the expressions in Problems 13–30.

13. $f(2)$	**14.** $f(1)$	**15.** $f(-1)$
16. $f(-2)$	**17.** $g(3)$	**18.** $g(1)$
19. $f(0)$	**20.** $f(\frac{1}{3})$	**21.** $g(-3)$
22. $g(-2)$	**23.** $f(1) + g(2)$	**24.** $g(1) + f(2)$
25. $g(2) - f(2)$	**26.** $f(3) - g(3)$	**27.** $g(3) \cdot f(0)$
28. $g(0) \cdot f(-2)$	**29.** $\dfrac{g(-2)}{f(-2)}$	**30.** $\dfrac{g(-3)}{f(2)}$

In Problems 31–38, use the following graph of a function f to determine x or y to the nearest integer, as indicated. Some problems may have more than one answer.



31. $y = f(-5)$	**32.** $y = f(4)$	**33.** $y = f(5)$
34. $y = f(-2)$	**35.** $0 = f(x)$	**36.** $3 = f(x), x <$
37. $-4 = f(x)$	**38.** $4 = f(x)$	



find each of the

15. $f(-1)$
18. $g(1)$
21. $g(-3)$
24. $g(1) + f(2)$
27. $g(3) \cdot f(0)$
30. $\dfrac{g(-3)}{f(2)}$

aph of a function f to s indicated. Some ver.

33. $y = f(5)$
36. $3 = f(x), x < 0$

B *In Problems 39–48, find the domain of each function.*

39. $F(x) = 2x^3 - x^2 + 3$
40. $H(x) = 7 - 2x^2 - x^4$
41. $f(x) = \dfrac{x-2}{x+4}$
42. $g(x) = \dfrac{x+1}{x-2}$
43. $F(x) = \dfrac{x+2}{x^2+3x-4}$
44. $G(x) = \dfrac{x-7}{x^2+x-6}$
45. $g(x) = \sqrt{7-x}$
46. $f(x) = \sqrt{5+x}$
47. $G(x) = \dfrac{1}{\sqrt{7-x}}$
48. $F(x) = \dfrac{1}{\sqrt{5+x}}$

49. Two people are discussing the function

$$f(x) = \frac{x^2-4}{x^2-9}$$

and one says to the other, "$f(2)$ exists but $f(3)$ does not." Explain what they are talking about.

50. Referring to the function in Problem 49, do $f(-2)$ and $f(-3)$ exist? Explain.

The verbal statement "function f multiplies the square of the domain element by 3 and then subtracts 7 from the result" and the algebraic statement "$f(x) = 3x^2 - 7$" define the same function. In Problems 51–54, translate each verbal definition of a function into an algebraic definition.

51. Function g subtracts 5 from twice the cube of the domain element.
52. Function f multiplies the domain element by -3 and adds 4 to the result.
53. Function G multiplies the square root of the domain element by 2 and subtracts the square of the domain element from the result.
54. Function F multiplies the cube of the domain element by -8 and adds 3 times the square root of 3 to the result.

In Problems 55–58, translate each algebraic definition of the function into a verbal definition.

55. $f(x) = 2x - 3$
56. $g(x) = -2x + 7$
57. $F(x) = 3x^3 - 2\sqrt{x}$
58. $G(x) = 4\sqrt{x} - x^2$

Determine which of the equations in Problems 59–68 specify functions with independent variable x. For those that do, find the domain. For those that do not, find a value of x to which there corresponds more than one value of y.

59. $4x - 5y = 20$
60. $3y - 7x = 15$
61. $x^2 - y = 1$
62. $x - y^2 = 1$
63. $x + y^2 = 10$
64. $x^2 + y = 10$
65. $xy - 4y = 1$
66. $xy + y - x = 5$
67. $x^2 + y^2 = 25$
68. $x^2 - y^2 = 16$

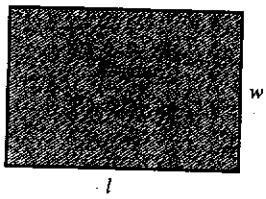
69. If $F(t) = 4t + 7$, find: $\dfrac{F(3+h) - F(3)}{h}$
70. If $G(r) = 3 - 5r$, find: $\dfrac{G(2+h) - G(2)}{h}$
71. If $Q(x) = x^2 - 5x + 1$, find: $\dfrac{Q(2+h) - Q(2)}{h}$
72. If $P(x) = 2x^2 - 3x - 7$, find: $\dfrac{P(3+h) - P(3)}{h}$

C *In Problems 73–80, find and simplify:*

$$\frac{f(a+h) - f(a)}{h}$$

73. $f(x) = 4x - 3$
74. $f(x) = -3x + 9$
75. $f(x) = 4x^2 - 7x + 6$
76. $f(x) = 3x^2 + 5x - 8$
77. $f(x) = x^3$
78. $f(x) = x^3 - x$
79. $f(x) = \sqrt{x}$
80. $f(x) = \dfrac{1}{x}$

Problems 81–84 refer to the area A and perimeter P of a rectangle with length l and width w (see the figure).



81. The area of a rectangle is 25 square inches. Express the perimeter $P(w)$ as a function of the width w, and state the domain of this function.
82. The area of a rectangle is 81 square inches. Express the perimeter $P(l)$ as a function of the length l, and state the domain of this function.
83. The perimeter of a rectangle is 100 meters. Express the area $A(l)$ as a function of the length l, and state the domain of this function.
84. The perimeter of a rectangle is 160 meters. Express the area $A(w)$ as a function of the width w, and state the domain of this function.

p. 18-19 #2-48 even, 74, 76, 81

(2) yes (4) no (6) yes (8) yes (10) no (12) no

(14) $f(1) = 3(1) - 2$ $\boxed{f(1) = 1}$

(16) $f(-2) = 3(-2) - 2$ $\boxed{f(-2) = -8}$

(18) $g(1) = 1 - 1^2$ $\boxed{g(1) = 0}$

(20) $f(\frac{1}{3}) = 3(\frac{1}{3}) - 2$ $\boxed{f(\frac{1}{3}) = -1}$

(22) $g(-2) = -2 - (-2)^2$ $\boxed{g(-2) = -6}$

(24) $g(1) + f(2)$

$1 - 1^2 + 3(2) - 2$

$1 - 1 + 6 - 2$

(4)

(26) $(3(3) - 2) - (3 - (3)^2)$

$(9 - 2) - (3 - 9)$

$7 - -6$

(13)

(28) $g(0) \cdot f(-2)$

$(0 - 0)(3(-2) - 2)$

(0)

(30) $\frac{g(-3)}{f(2)} = \frac{-3 - (-3)^2}{3(2) - 2} = \frac{-3 - 9}{6 - 2} = \frac{-12}{4}$ (-3)

(32) $f(4) = 0$ (34) $f(-7) = 3$ (36) $x = -2 + 4$ (38) $x = 5$

(40) D: $\mathbb{R}$ (42) $x \neq 2$ (44) $x^2 + x - 6$

$(x - 2)(x + 3)$

$\boxed{x \neq 2, -3}$

(46) $5 + x \geq 0$

$\boxed{x \geq -5}$

(48) $x \neq -5$ (74) $\frac{-3(a+h) + 9 - (-3a + 9)}{h} = \frac{-3a - 3h + 9 + 3a - 9}{h}$

$= \frac{-3h}{h} = \boxed{-3}$

7e) $\dfrac{3(a+h)^2+5(a+h)-8-(3a^2+5a-8)}{h}$

$\dfrac{3(a^2+2ah+h^2)+5a+5h-8-3a^2-5a+8}{h}$

$\dfrac{3a^2+6ah+3h^2+5h-3a^2}{h}$

$\dfrac{6ah+3h^2+5h}{h} = \boxed{6a+3h+5}$

8) $\dfrac{25}{w} = \dfrac{lw}{w}$

$l = \dfrac{25}{w}$

$P(w) = 2\left(\dfrac{25}{w}\right)+2w$

$\boxed{P(w) = \dfrac{50}{w}+2w}$

$\boxed{D: w \geq 0 \quad R: P(w) \geq 0}$